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Constraints Interaction in the Syllabification in Olusuba

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Abstract
This paper analyses the syllable structure of Olusuba. In the syllabification in Olusuba, just as in other languages, a principle of well-formedness is factored in by the speakers of the language through their use of brain faculties responsible for language formation and use. Well-formedness is understood to be a by-product of competing universal constraints – the constraints outdo their counterparts in the ranking, which is language specific, in the formation of an output. The job of constraint is, therefore, is to block all except the correct output. My analysis of syllabification in Olusuba is couched within the constraint interaction, a tenet of the Optimality Theory (OT) by Prince and Smolensky (2004). Data for analysis was collected through audio-recording of continuous speeches in natural settings. Audio-recorded speeches were then played back and transcribed using phonemic mode of transcription. From the transcript a corpus construct was made. The construct was a list of Olusuba words. Three native speakers of Olusuba were at different moments instructed to read naturally the words constituting the corpus construct by taking a breath word after word. The analysis of the data was descriptively done within the framework of OT's principle of well-formedness which is grounded on constraint interaction. The findings of this study indicate that other than the universal syllable structure CV, Olusuba displays other syllable patterns formed from competing Universal Grammar (UG) representational constraints. Findings for this study give an insight to the morphophonological structure of Olusuba words; enable linguists understand internal structure of Olusuba syllables and enlighten linguists on phonotactic constraints behind syllabification of Olusuba words.

Introduction

A syllable is defined as a unit of prosodic organisation (Kubozono, 1989). Kubozono (1989) uses moraic languages likes Japanese languages to demonstrate the prosodic nature of a syllable. In Japanese languages, according to Kubozono (1989), a syllable occurs as an indispensable prosodic constituent. Kubozono's (1989) definition of a syllable is based on preferred foot structure. Laboz (2012), on the other hand, argues that a syllable is as a segmentation unit in languages which is based on duration. The exact duration of a specific syllable has been found to depend on factors such as the segmental nature of its sounds, as demonstrated by fricative and taps in which case fricatives are longer than taps (Pike, 1947). Syllable structure also depends on the number of segments that form part of it. This segmentation is dependent on language (Clements, 1990 & Bassene, 2012).

Phonologists, Carlisle (2001); Cairns and Feinstein (1982); Clements and Keyser (1983) and Jakobson (1962) argue that the syllable feature corresponds intuitively to the notion of consonant versus vowel (CV); hence, the commonality of the CV structure in languages. Every syllable, for this matter, must begin with a consonant; that is, every syllable must have an onset. This has not barred languages from exhibiting their other unique syllable structures. The uniqueness is affirmed by Bassene (2012), who posits that languages have specific requirements for permissible syllables. Bassene's (2012) observation is in line with Jakobson (1962) as well as Clements and Keyser's (1983) earlier findings that other languages do not permit syllables ending in codas and even languages that allow both onsets and codas, restrict the number of consonants which can occur in these positions. Differences in how sounds are segmented in languages may be attributed to parametric variations in languages' phonological patterns. As shown in Bena, only open syllables are allowed, and word-initial syllables can occur with or without an onset (Morrison, 2011). Morrison (2011) also notes that syllable onsets in this language may be either simple or complex. Complex onsets include nasal-consonant sequences (a feature common in Bantu languages), the voiceless alveolar affricate and consonant-glide sequences.

Other observations on parameters under which languages' phonological pattern operates have been made on the distribution of syllable structures. In terms of the distribution of syllable structures, there are some languages in which the distribution is unrestricted. As seen in Bena, the distribution of syllable structure is unrestricted, although glides arise from vowel adjacency resolution occurring at morpheme boundaries (Morrison, 2011). Eegimaa, on the other hand, allows both onsetless syllables and syllables with codas (Bassene, 2012). Several principles govern the type of consonants that occur in the coda position in Eegimaa syllables. Bassene (2012) attests to this using singletons and geminates in which he makes a discovery that in Eegimaa, any singleton consonant can occur in a word-final coda and geminates consisting only of voiceless stops are also found in that position. In addition, the word-medial coda in this language must be a nasal or any singleton consonant identical to the following onset.

In isolating languages like English, as reported by Bassene (2012), the syllabic feature goes beyond vowel/consonant split. This language permits syllabic sonorants such as [r], [l] and [n], while other languages, such as Serbo-Croatian, have syllabic sonorants which phonemically contrast with nonsyllabic sonorants. In Serbo-Croatian, syllabic [r̩] contrasts with nonsyllabic [r]. As argued by Bassene (2012), this behaviour is also displayed by Kiswahili, especially in the semantic differentiation of some words. The data on syllabic consonants in English, Serbo-Croatian and Kiswahili show that consonants can also acquire syllable quality independent of vowels.

Segmentation has also been analysed using disjunctive phonemes. Sambou (2005), for example, postulates the existence of disjunctive phonemes, which occur between two adjacent vowels and are assigned to different syllables. As observed in post-Bloomfieldian structuralists, disjunctive phonemes do not have phonetic properties, hence called juncture phonemes (Bloch & Trager, 1942). Harris (1951), on the other hand, describes these phonemes as zero morphemes despite their distinctive functions, they do not have any phonetic realisation. This is proved in Eegimaa, where a disjunctive phoneme is responsible for the vowel-zero alternations in its syllable structure (Bassene, 2012).

Some languages employ hiatus resolution strategies in the process of segmentation. This is common in most Bantu languages that disallow dissimilar vowel sequences (Bassene, 2012; Odden, 1993 & Ondondo, 2013). These resolutions can be attained by means of consonant insertion between two vowels, glide formation, deletion of one of the vowels with or without compensatory lengthening. Optimality Theory assumes that a constraint against hiatus (*HIATUS) is part of Universal Grammar (Pulleyblank, 2003 & Tanner, 2006). However, how individual languages resolve hiatus depends on ranking this markedness constraint concerning faithfulness constraints. Languages that do not resolve hiatus have correspondence constraints (McCarthy, 2008). Syllable features responsible for hiatus resolution are language-specific. The dependence of constraints' ranking on language's hierarchy gives unique syllable structures in languages worldwide (Barasa, 2022).

Regarding syllabification in Bantu languages, two main issues are emerging about the syllable structure of these languages: syllable status of consonant clusters and the resolution of vowel hiatus (Odden, 1993). Odden (1993) notes that two kinds of consonant clusters have a central status in Bantu. The clusters include homorganic Nasal-Consonant (NC) sequences and Consonant-Glide (CG) sequences. CG sequence is a syllable structure developed in resolving vowel hiatus caused by a sequence of dissimilar vowels. Odden (1993) observed that it is common in Bantu languages for morpheme concatenation to give rise to underlying sequences of dissimilar vowels, where such sequences are partially or eliminated at the surface. Glide formation is one of the phonological processes responsible for such a resolution, which mostly results in CG or NCG sequences in the output, hence a language-specific syllable structure.

The previous case studies inform the proposed study on circumstances that underlie the differences in how syllables are patterned in languages. As Abercrombie (1967) puts it, each language has a selection of syllable structures constrained by its phonotactic constraints. Olusuba, not excluded, has a range of syllable structures constrained by its phonotactics, which is the focus of this paper. The paper is organised into four sections: Section 2 handles methodology. This is followed by section 3 on findings and discussions of the findings. OT data analysis is handled in section 4, with section 5 summarising the paper.

Methodology

The research design adopted in this study was descriptive-analytic. Descriptive analytic research design describes a phenomenon and explains why and how it displays a particular pattern (Denzin & Lincoln, 2003). The study sought to describe syllable patterns in Olusuba words on the observable surface and underlying forms of the words. These forms constituted both free and bound morphemes. Bound morphemes included augment and class prefixes of nouns as well. The choice of the research method used in this study was anchored on the linguistic competence of the speakers of Olusuba.

This study was carried out on Mfangano Island, an Island which, according to Rottland and Okombo (1992), is enriched with vibrant and functioning Olusuba speech community evenly distributed. Data for this study were in the form of corpus constructs. The corpus construct comprises real words extracted from continuous speeches in natural settings on Mfangano Island. The researcher adopted the inactive participant observation method to collect the speeches, which involved only the researchers' observation and recording of continuous speeches with a Sony IC Recorder ICD-MX20. The inactive participant-observation method allowed the researcher to jot down relevant information and observe the scenery. The method also allowed the researcher to participate passively in the scene or action, thereby assuring reality. The audio-recorded speeches were then played back for phonemic transcription. From the transcripts, words were randomly sampled thus providing corpus constructs for analysis. Three native speakers were instructed to slowly read words in the corpus constructs at different moments by taking a breath word after word. Data analysis involved organising, describing, discussing and explaining the data according to the emerging syllable patterns. The identified syllable patterns were then analysed within the OT framework. The data analysed was presented in descriptive write-ups. Examples alluded to were represented in a three or four-tier format where appropriate and given morpheme by morpheme glossing. OT analyses were presented in tableaux as the theory requires.

Findings and Discussions

According to the findings of this study, there are ten syllable structures exhibited by the phonology of Olusuba. The ten-syllable structures are discussed in the following sub-sections.

The CV Syllable Structure

An Olusuba CV structure constitutes one consonant and one vowel segment. This pattern is presumably found in all languages (Clements & Keyser, 1983; Jakobson, 1962). This is the predominant pattern observed in Olusuba words. The pattern can occur in three positions in Olusuba words: First, the pattern can occur word-initially, as example (1) shows.

1. ***ki.****r-a*
   defeat-2Ssg
   'Defeat'

Second, the pattern can occur word-medially. Consider the data in (2).

2. *so.****mo.****k-a*
   run-2Ssg
   'Run'

Third, the pattern can occur word-finally as the data in example (3) illustrates.

3. *ka.****m-a***
   milk-2Ssg
   'Milk'

The V Syllable Structure

In Olusuba onsetless syllables are permitted hence the pattern V. The pattern can only occur word-initially in Olusuba words. Consider the data in example (4).

4. a) ***e.****-ki.-nu*
   AUG-7-mortar
   'mortar'
   b) ***i.****z-a*
   come-2Ssg
   'Come'

The CVV Syllable Structure

The Olusuba CVV pattern comprises a consonant and a long vowel. The pattern can occur word-initially. Consider the data in example (5).

5. ***ree.****t-a*
   bring-2Ssg
   'Bring!'

The CVV structure can also occur word-medially in Olusuba words as seen in (6).

6. *a.-w****a-a.****la*
   AUG-2-girl
   'girls'

The CVV pattern cannot occur word-finally in Olusuba words since Olusuba, as previously discussed, disallows long vowels word-finally.

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The NCV Syllable Structure

The Olusuba NCV pattern comprises a NC cluster and a vowel. The pattern can occur word-initially as shown in example (7).

7. SR: ***m-fu**.m-a*
UR: *ny-fum-a*
1Ssg-leave-IND
'I leave'

The pattern can occur word-medially in Olusuba words as example (8) shows.

8. SR: *ee.-**m-vu**.wu*
UR: *e-ny-vuwu*
AUG-9-hippopotamus
'hippopotamus'

The pattern can also occur word-finally as example (9) demonstrates.

9. SR: *a.-waa.-**ntu***
UR: *a-wa-ntu*
AUG-2-human
'humans'

The NCVV Syllable Structure

The NCVV pattern in Olusuba is made up of a Nasal Consonant (NC) cluster and a long vowel. Consider the word in example (10).

10. SR: ***m-fuu**.z-a*
UR: *ny-fuuz-a*
1Ssg-spit-IND
'I spit'

In terms of distribution, the pattern can occur word-initially as shown in the data in example (11).

11. SR: ***m-p**uu.r-a*
UR: *ny-puur-a*
1Ssg-feel-IND
'I feel'

The pattern can also occur word-medially as shown in example (12).

12. SR: *ee.-**n-s**ii.mbo*
UR: *e-ny-siimbo*
AUG-9-club
'club'

The NCVV pattern does not occur word-finally in Olusuba since the language disallows long vowels word-finally.

The CGVV Syllable Structure

The Olusuba CGVV pattern constitutes a consonant followed by a glide and a long vowel. Consider the data in examples (13) and (14).

13. SR: *o.-**mw-aa**.na*
UR: *o-mu-ana*
AUG-1-child
'child'

14. SR: *e.-**ky-ee**.yo*
UR: *e-ki-eyo*
AUG-9-broom
'broom'

In terms of distribution, the pattern CGVV can occur both word-initially and word-medially but not word-finally. Consider the data in examples (15) and (16).

15. ***swaa**.wu.k-a*
cane-2Ssg
'Cane!'

16. SR: *e.-**ky-ee**.rema*
UR: *e-ki-erema*
AUG-7-dark
'darkness'

Just as NCVV pattern, the CGVV does not occur word-finally in Olusuba as the language does not permit long vowels word-finally.

The CGV Syllable Structure

The CGV pattern in Olusuba consists of a consonantal sound, a glide and a vowel. This pattern only occurs word-finally where a vowel is not compensatorily lengthened after the gliding of the high front vowel /i/ or the high back vowel /u/ into the approximants /y/ or /w/ respectively. Consider the data in example (17).

17. a) SR: ***ry-a***
UR: *ri-a*
eat-2Ssg
'Eat'
b) SR: *o.-wu.-**lwo***
UR: *o-wu-luo*
AUG-14-thirst
'thirst'

The NCGV Syllable Structure

The Olusuba NCGV structure constitutes a NC cluster, a glide and a vowel. The pattern is restricted to word-final position as the data in (18) illustrates.

18. a) *sii.**mb-w-a***
plant-PASS-2Ssg
'be planted by'
b) *fuu.**mb-w-a***
cook-PASS-2Ssg
'be cooked by'

The NCGVV Syllable Structure

The NCGVV pattern occurs in Olusuba when a NC cluster is followed by a glide and a long vowel. This pattern can occur both word-initially and word-medially as shown in (19) and (20).

19. ***n.zyuu**.k-a*
1Ssg-resurect-IND
'I resurrect'

Vol. 2 No. 1 (2023): ISSN (Online): 2957-8477.
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20. SR: *ee.-**n-tyee**.ng'i*
UR: *e-ny-tyeeng'i*
AUG-9-animal
'Animals'

The VV Syllable Structure

The Olusuba VV structure is a sequence of two identical vowels realised as one long vowel on articulation. This pattern is restricted to a word-initial position. See the data in (21).

21. a) ***a-a***.*ga.l-a*
1Ssg-want-IND
'he/she wants'
b) SR: ***oo***.*-n-ku.lu.l-a*
UR: *o-ny-kulul-a*
1Ssg-1Osg-pull-IND
'you pull me'

Table (1) summarises the occurrence of the nine syllable patterns in Olusuba words (Only the Surface Representation (SR) forms are given in the table).

Table 1: Olusuba Syllable Types

Syllable Type	Word-Initial	Word-Medial	Word-Final
V	***e***.*ki.ti* 'cane'		
CV	***te***.*ma*! 'Slash!'	*e.ki.**su**.su* 'hare/rabbit'	*see.**sa***! 'Winnow!'
CVV	***ree***.*ta*! 'Bring!'	*e.**paa**.si* 'iron box'	
NCV	***m-bo***.*na* 'I come'		*o.mu.goo.**ngo*** 'back'
NCVV	***n-too***.*la* 'I take'	*ee-**n-saa**.gi* 'housefly'	
CGVV	***gwaa***.*sii.mbwa* 'be planted by'	*o.**mwaa**.na* 'child/baby'	
CGV			*se.me.re.**zya***! 'Cheat!'
NCGV			*gii.**ngwa*** 'be carried by'
NCGVV	***n-kyaa***.*ri* 'I hold/retain'	*sii.**mbwaa**.na* 'be planted by each other'	
VV	***ee***.*mpa.la* 'clay soil'		

OT Analysis of Olusuba Syllable Structure

This section gives an OT account of the nine syllable structures discussed above some of which are unique to Olusuba. As previously discussed, Olusuba only allows open syllables. Therefore, in the process of syllabification of an Olusuba word, only open syllables are exhibited. In OT terms, syllabification in Olusuba, as in other Bantu languages, involves the satisfaction of a markedness constraint that prohibits closed syllables. This invokes the constraint *CODA. The openness nature of

Olusuba syllables makes the markedness constraint *CODA inviolable hence its placement above other constraints relevant in the analysis of Olusuba syllable structure. The constraint is defined as shown in (a).

a) *CODA: Syllables do not have codas (Prince & Smolensky, 2004).

For the surface realisation of any Olusuba syllable structures, all the segments of a syllable in the input should be preserved in the output and no insertion or deletion of a segment should take place in the output. To account for this, the following faithfulness constraints in (b) and (c) are adopted.

b) DEP-IO: Output segments must have input correspondent; epenthesis must not occur (McCarthy, 2008).

c) MAX-IO: Input segments must have output correspondent; deletion must not occur (Kager, 1999).

All Olusuba syllable structures, other than the V and VV syllable patterns, are characterised by an onset. To accommodate the onsetless syllables in Olusuba, the markedness constraint that requires a syllable to have an onset must be ranked below the three constraints above. This constraint is stated in (d).

d) ONSET: Syllables must have onsets (Prince & Smolensky, 2004)

The ranking of the constraints above is as shown below.

*CODA >> DEP-IO, MAX-IO >> ONSET

As noted in the preceding section, the unmarked syllable structure in Olusuba, as in other languages, is CV (Clements & Keyser, 1983). This pattern is made up of a nucleus – an obligatory constituent of a syllable and an onset (Clements, 1990 & Davis, 1985). To account for this structure in Olusuba, the markedness constraints ONSET, though lowly ranked, is satisfied by the best candidate. This structure also obeys the Bantu phonotactic which disallows closed syllables hence the satisfaction of the highest ranked markedness constraint, *CODA.

The following tableau shows how these constraints interact in order to come up with the optimal candidate.

gona ~ go.na	*CODA	DEP-IO	MAX-IO	ONSET
☞a) go.na				
b) go.a			*!	*
c) gon.a	*!			*

Candidate (c) is ruled out for violating the highest ranked constraint *CODA that militates against a closed syllable, a characteristic exhibited by the first syllable of this candidate. The deletion of a segment in candidate (b) causes it to violate the constraint MAX-IO. Because of this violation, the candidate is ruled out. Candidate (a) on the other hand satisfies all the constraints which the other candidates do not hence its selection as the optimal candidate.

The V and the VV syllable patterns in Olusuba lack onsets. Lack of onset in Olusuba syllables works against the markedness constraint, ONSET. Therefore, in order to capture this situation, this constraint has to be violated by the optimal candidate.

The following tableau shows how the constraints above interact to select the optimal candidate bearing a V structure.

ekinu ~ e.ki.nu	*CODA	DEP-IO	MAX-IO	ONSET
☞a) e.ki.nu				*
b) ki.nu			*!	
c) Ce.ki.nu		*!		
d) e.kin.u	*!			*

Candidate (d) violates the highly ranked constraint *CODA hence its disqualification. Candidate (c) shows the epenthesis of a consonantal sound (C) to break the V structure. This causes its violation of the highly raked constraint, DEP-IO hence its disqualification. Candidate (b) violates the constraint, MAX-IO that prohibits deletion. This violation leads to the ruling out of the candidate. Despite its violation of the lowly ranked constraint, ONSET, candidate (a) is still optimised since it satisfies all other constraints that the other candidates do not.

Olusuba is known to permit a VV syllable structure. This shows the potentiality of vowels in this language to be long. This is against the universally unmarked length for vowels which is short (Clark, Yallop & Fletcher, 2007). This potentiality violates a faithfulness constraint that prohibits long vowels. This constraint is given below.

e) *VV: Vowels within a syllable must be short (Clark, Yallop & Fletcher, 2007).
For the surface realisation of long vowels in Olusuba, the constraint *VV must be outranked by other constraints as shown below.
*CODA >> DEP-IO, MAX-IO >> ONSET >> *VV
The tableau below shows how these constraints interact to select the best candidate with a VV syllable pattern.

aagala ~ aa.ga.la	*CODA	DEP-IO	MAX-IO	ONSET	*VV
☞a) aa.ga.la				*	*
b) a.ga.la			*!	*	*
c) a.Ca.ga.la		*!	*	*	
d) a.gal.a	*!		*	*	

Candidate (d) is disqualified for violating a highly ranked constraint, *CODA since its second syllable is a closed one. Candidate (c) exhibits epenthesis of a consonantal sound to break the VV pattern hence its violation of the highly ranked constraint, DEP-IO. This violation causes the disqualification of the candidate. Candidate (b) on the other hand breaks the VV pattern by deletion of a vowel segment thus violating the constraint, MAX-IO hence its disqualification. Candidate (a) is optimised because it satisfies all the inviolable constraints.
The same ranking shown above can be used to analyse a CVV syllable pattern in Olusuba as shown in the tableau below.

reeta ~ ree.ta	*CODA	DEP-IO	MAX-IO	ONSET	*VV
☞a) ree.ta					*
b) re.e.ta				*	
c) re.ta			*!		
d) re.Ce.ta		*!			
e) reet.a	*!			*	*

Candidate (e) is ruled out for violating the highest ranked constraint *CODA by allowing a closed syllable, a characteristic prohibited by this constraint. Candidate (d) violates the second highly ranked constraint, DEP-IO by allowing epenthesis of a consonantal sound to break the VV sequence. Candidate (c) on the other hand shows the deletion of a vowel segment thus violating the constraint, MAX-IO, that militates against deletion. This causes the candidate to be ruled out. Violation of the constraint, ONSET by candidate (b) causes its disqualification. This leaves candidate (a) as the optimal candidate since it satisfies all the constraints that the other candidates do not.
According to the existing data, Olusuba syllable structure allows clusters in the onset thus violating the constraint that prohibits complex onsets. This constraint is given in (f).

f) *COMPLEX$_{Ons}$: Syllables at most are one consonant at an edge; onsets are simple (Kager, 1999).

Following SSP, in a consonant cluster at the onset position, the first consonant must have a lower sonority value than the following consonant (Clements, 1990). This satisfies the constraint, *FALL. This constraint is explained in (g).

g) *FALL: Sonority must not fall within a syllable onset (Bat-El, 1996).

Syllabifying an Olusuba nasal in a NC sequence in the onset position creates an ill formed syllable according to the SSP since the sonority scale falls from the nasal to the next obstruent instead of vice versa hence the violation of the constraint *FALL. Therefore, for the syllable structures NCV, NCGV, NCVV and NCGVV to be captured in Olusuba, the constraint *FALL must be ranked relatively low. With the adoption of the constraints in (f) and (g) above in the analysis of bi-consonantal and tri-consonantal onsets in Olusuba, the following ranking is used.

*CODA >> DEP-IO, MAX-IO >> ONSET >> *VV >> *COMPLEX$_{Ons}$ >> *FALL

The tableau below shows how these constraints interact in the selection of the best candidate bearing a NCV syllable pattern.

nkama ~ nka.ma	*CODA	DEP-IO	MAX-IO	*VV	*COMPLEX$_{Ons}$	*FALL
☞a) nka.ma					*	*
b) ka.ma			*!			
c) nV.ka.ma		*!				
d) n.ka.ma	*!					
e) nkam.a	*!				*	*

Candidates (e) and (d) are ruled out for violating the highest ranked constraint, *CODA by exhibiting closed syllables in their first syllables, a characteristic prohibited by this constraint. Candidate (c) is characterised by vowel insertion, a morphological behavior militated against by the highly ranked constraint, DEP-IO hence its disqualification. Candidate (b) is ruled out on the ground that it violates the highly ranked constraint, MAX-IO by deleting one of its segments. Despite its violation of the lowly ranked constraints, candidate (a) is still selected as the best candidate following its satisfaction of all the highly ranked constraints. When the pattern is NCGV, the constraints above interact as shown in the tableau below.

ngia ~ ngya	*CODA	DEP-IO	MAX-IO	*VV	*COMPLEX$_{Ons}$	*FALL
☞a) ngya					*	*
b) nga			*!		*	*
c) ngV.ya		*!			*	*
d) n.gya	*!				*	

Candidate (d) is characterised by a closed syllable. This causes it to violate the highest ranked constraint *CODA hence its disqualification. The insertion of a vowel segment within candidate (c) causes it to violate the constraint, DEP-IO thus leading to its disqualification. Candidate (b) on the other hand satisfies the constraints *CODA and DEP-IO but fails to satisfy the constraint, MAX-IO thus leading to its disqualification. Candidate (a), on the other hand, is picked as the best candidate because it satisfies the highly ranked constraints not satisfied by the other candidates. In the NCVV pattern, the constraints interact in the selection of the best candidate as shown in the tableau below.

ɲpuura ~ mpuu.ra	*CODA	DEP-IO	MAX-IO	*VV	*COMPLEX$_{Ons}$	*FALL
☞a) mpuu.ra				*	*	*
b) mpu.ra			*!		*	*
c) mV.puu.ra		*!		*		
d) m.puu.ra	*!			*		

As shown in the tableau above, Candidate (d) is ruled out for violating the highest ranked constraint *CODA. Vowel (V) epenthesis in candidate (c) makes it violate the second ranked constraint DEP-IO which prohibits insertions hence the disqualification of the candidate. Candidate (b) is ruled out for violating the highly ranked constraint MAX-IO. Candidate (a) is picked as the optimal candidate because it satisfies all the inviolable constraints the other candidates do not satisfy. In the NCGVV pattern, these constraints interact as demonstrated by the tableau below.

ɲziuka ~ nzyuu.ka	*CODA	DEP-IO	MAX-IO	*VV	*COMPLEX$_{Ons}$	*FALL
☞a) nzyuu.ka				*	*	*
b) nzi.ka			*!		*	
c) nV.zu.ka		*!	*			
d) nzyuuk.a	*!			*	*	*

Following its display of a closed syllable candidate (d) violates the highly ranked constraint *CODA hence its disqualification. Candidate (c) is ruled out for violating the highly ranked constraint, DEP-IO. Candidate (b), on the other hand, is ruled out because it violates the constraint, MAX-IO which is highly ranked. Candidate (a) is picked as the optimal candidate as it satisfies all the highly ranked constraints which the other candidates fail on.

Conclusion

Ten syllable structures are established in Olusuba. They include CV, CVV, V, VV, NCV, CGV, NCGVV, CGVV, NCVV and NCGV. Out of the ten syllable patterns, five patterns NCGVV, CGVV, CVV, NCVV and VV are characterised by bimoraicity hence classified as heavy syllables. The other five patterns CV, V, NCV, CGV and NCGV have no branching nuclei hence their classification as light syllables. In terms of OT analysis of these structures, it is established in Olusuba that universal constraints responsible for the well-formedness of the nine syllable structures are independently motivated by Olusuba's hierarchy in their ranking.

References

Abercrombie, D. (1967). *Elements of General Phonetics.* Edinburg University Press.

Barasa, D. (2022). Pronouns and Pronominal Alignment. *Arusha Working Papers in African Linguistics. 4*(1), 100-114.

Bassene, M. (2012). Morphophonology of Joola Eegimaa. Unpublished PhD dissertation. The University of Minnesota.

Bat-EL, O. (1996). Phonologically-based word formation: Modern Hebrew blends. In Kleinhenz (ed.), *Interfaces in Phonology,* 231-250. Akademie Verlag.

Cairns, C. E., & Feinstein, M.H. (1982). Markedness and the Theory of Syllable Structure. *Linguistic Inquiry, 13*(2), 193-225.

Carlisle, R. S. (2001). Syllable structure universals and second language acquisition. *International Journal of English Studies. 1*(1), 1-19.

Chomsky, N., & Halle, M. (1968). *The Sound Pattern of English*. Harper and Row.

Clark, J., Yallop, C., & Fletcher, J. (2007). *An Introduction to Phonetics and Phonology*. Blackwell Publishing.

Clements, G. N. (1985). The Geometry of Phonological Features. *Phonology Yearbook 2,* 225-252.

Clements, G. N. (1990). The role of the sonority cycle in core syllabification. *Papers in laboratory phonology 1: between the grammar and physics of speech*. Ed. By John Kingston and Mary Beckman, 283-333. Cambridge: Cambridge University Press.

Clements, G. N., & Keyser, S.J. (1983). *CV Phonology: A Generative Theory of the Syllable.* MIT Press.

Davis, S. (1985). Syllable weight in some structures in Phonology. MIT, Dep. Linguist Unpublished ms.

Denzin, N. K, & Lincoln, Y. S. (2003). *Collecting and Interpreting Qualitative Materials* (2nd ed.). Sage Publication, Inc.

Harris, Z. S. (1951). *Methods in Structural Linguistics.* University of Chicago Press.

Jakobson, R. (1962). *Selected writings 1: Phonological studies.* Mouton.

Jakobson, R. (1968). *Child Language. Aphasia and Phonological Universals,* Mouton (revised version of *Kindersprache, Aphasie und allgemeine Lautgesetze*, Uppsala, 1941).

Kager, R. (1999). *Optimality Theory.* Cambridge University Press.

Kubozono, H. (1989). The Mora and Syllable Structure in Japanese: Evidence from Speech Errors. *Language and Speech,* 32(3), 249-278.

Laboz, C. B. (2010). Introduction to Linguistic Syllables. Lecture 8. http://www.middlebury.edu/files/2012/10.

Ladefoged, P. (2000). *Vowels and consonants. An introduction to the sounds of languages.* Basel Blackwell.

McCarthy, J. J. (2008). *Morphology: Optimality Theory.* University of Massachusetts.

Morrison, M. E. (2011). A Reference Grammar of Bena. Unpublished PhD thesis, Rice University.

Odden, D. (1993). Interaction between modules in Lexical Phonology. In S. Hargus & E.M. Kaisse (eds.). *Studies in Lexical Phonology*. San Diego.

Ondondo, E. A. (2013). Word Structure in Kisa. Unpublished PhD thesis, University of Newcastle, Australia.

Pike, K. L. (1947). *Phonemics: A technique for reducing languages to writing*. University of Michigan Press.

Prince, A., & Smolensky, Paul. (2004). *Optimality Theory. Constraint Interaction in Generative Grammar*. Blackwell.

Pulleyblank, D. (2003). *Yoruba vowel patterns: asymmetries through phonological competition*. Ms. UBC.

Rotland, F., & Okombo, D. (1992). Language Shift Among the Suba of Kenya. In M. Brezinger (ed.) *Language Death; Factual and Theoretical Explorations with Special Reference to East Africa*. Berlin & New York: Mouton de Gruyter. 273-284.

Sambou, P. M. (2005). Quelle phonologie pour les langues du Sénégal? www.sudlangues.sn/IMG/pdf/doc-95.pdf

Szczegielniak, A. (1999). That-t Effects Cross-linguistically and Successive Cyclic M Movement. *In Papers on Morphology and Syntax*, Cycle 1, pp. 369-393. MITWPL 33. Cambridge, MA: MITWPL.

Tanner, D. S. (2006). "Context Insensitive Hiatus in Ciyao". *Working Papers in Linguistics*. University of Washington.

Trubetzkoy, N. (1967). *Principles of Phonology*. University of California Press.